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SEMATOPHYLLUM RECURVANS.

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Michaux, in 1803, described two species of *Leskea* from the mountains of North Carolina, *L. recurvans* and *L. squarrosa*, the latter from damp humus. Both have been cited as synonyms of *Hypum recurvans*, following Schwaegrichen's Supplement of 1816, in which he stated that he could see no difference between them. This statement has not been questioned by recent authors, until the publication in THE BRYOLOGIST for July, 1902, in which I placed a question mark after two of the synonyms of this species. I did this after careful consideration of the descriptions given by Michaux and Bridel, and an examination of the earlier North American Exsiccatae; for it is evident that Sullivant's first understanding of this species differed from his later descriptions in the Icones. The possibility suggested itself, that one of the earlier synonyms of this species might antedate *S. delicatulum* (*H. laxepatulum*). This cannot be definitely settled without seeing the types, though a set of cotypes exist in the Boissier Herbarium at Geneva. Two attempts have been made to find the types at Paris, without success, so we must rely on the specimens preserved in the Schwaegrichen collection and on the original descriptions. In 1897, I had the privilege of examining these cotypes, and found they were mere fragments, and had therefore lost all distinctive macroscopic appearance, but the pedicels were 15-18mm. long, dark red and arcuate, the capsules horizontal, 1.5 to 2 mm. long, and the lid and peristome agreed with the figures of *H. recurvans* in Sullivant's Icones (Plate III). The basal alar cells, however, were more inflated than figured in the Icones, and were more like the ones shown in the plate accompanying this article. This cotype has also been examined by Cardot, who published a brief description in the Bulletin of the Boissier Herbarium for 1899, and concluded that they were referable to *Raphidostegium recurvans*, and that *L. squarrosa* is a synonym.

The original descriptions are somewhat contradictory, but if the specific names are any guide, they indicate two forms with two kinds of leaves, and suggest *S. recurvans* and *S. delicatulum*. The most striking difference is in the length of the pedicels; *L. recurvans* was described with a pedicel 6—8 long, and *L. squarrosa* nearly an inch. This amount of variation occurs in *S. recurvans*, though not usually on the same plant.

Bridel, in the Bryologia Universalis, recognized *H. recurvans* as the same species as *L. arcuata* Brid. and kept *L. squarrosa* Michx. as a variety, stating that at first they appear to be distinct species, but his descriptions do not indicate clearly in what way they differ. He described *H. recurvans* with the leaves densely imbricated, circinnate-falcate, and glossy yellow, the pedicel one-half to one inch long, the capsule nearly erect, and constricted below the mouth when dry.

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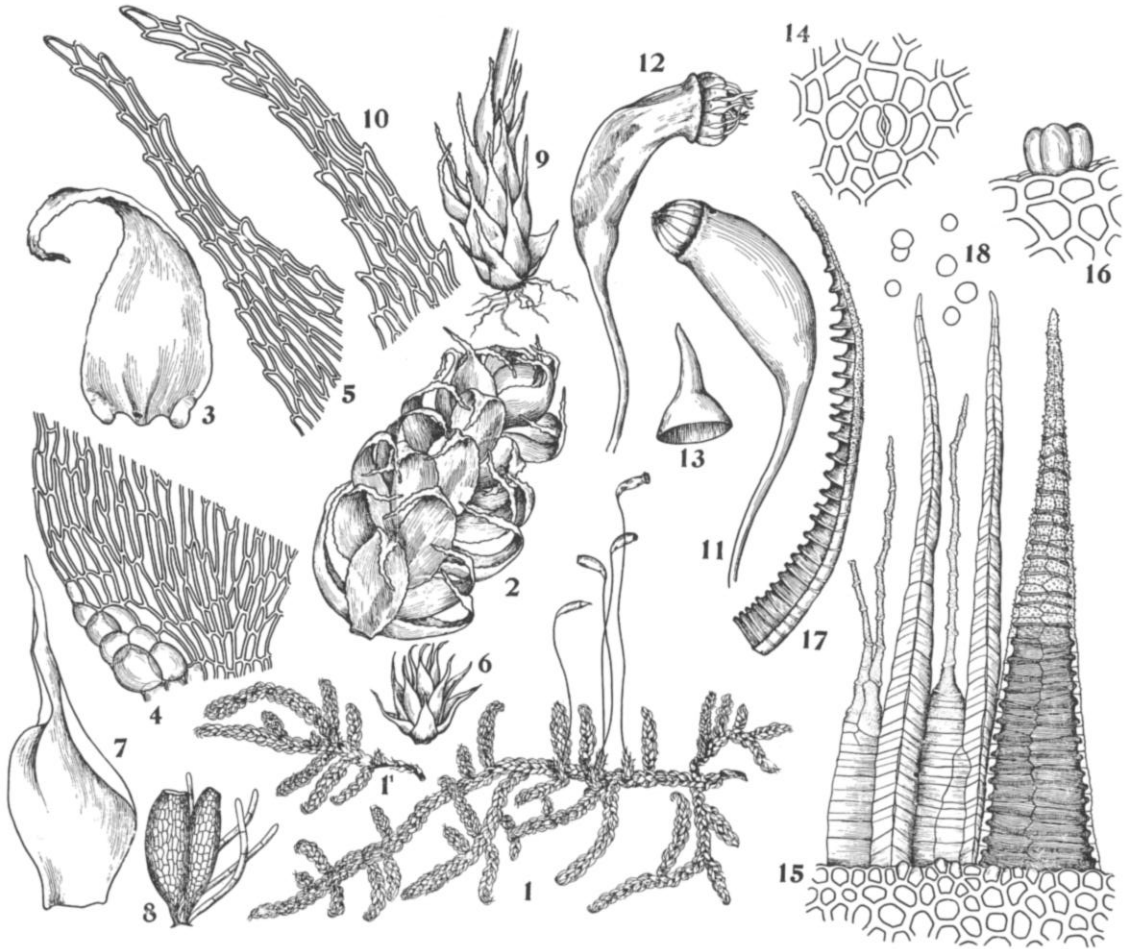

PLATE I.—*Sematophyllum recurvans.*

Austin expressed the opinion that *R. delicatulum* is only a starved form of *H. recurvans*, and that the figures in the Supplement to the Icones give a much better representation of this species than the figures in the first volume. He also stated that he had found it difficult to distinguish small forms of it from *H. cylindricarpum* when sterile and larger forms from *H. nemorosum*. I cannot agree with him altogether in these statements, though *H. recurvans* is not correctly represented in the Icones, as the basal alar cells are more inflated. That the plants intergrade, and have originated from one common species, is evident, but the most constant differences, as illustrated by Sullivant, are that *S. recurvans* is the larger and coarser species in all its parts, usually with a more erect and denser habit of growth, with longer pedicels and capsules, the lid being usually only half the length of the urn. *S. delicatulum* grows in thin appressed mats of a darker, less glossy green, with shorter pedicels and the lid equalling the urn. The position and recurving of the leaves is a less constant character, and is variable in both species, as *S. recurvans*, when growing over wet cushions of *Leucobryum* will often send out long creeping branches on which the leaves are scarcely recurved, and *S. delicatulum* is more commonly found with its leaves strongly recurved than with spreading leaves. In fact, *H. laxepatulum* was a poor substitute for the specific name *delicatulum*, as it is an abnormal form of the species. But Dr. Best and I are agreed that *S. recurvans* has an annulus, which cannot be found in *S. delicatulum*. The number and length of the cilia in both *S. recurvans* and *S. delicatulum* is variable, and the Manual is incorrect in stating that the cilia are none or rudimentary in the latter species. An examination of the type has shown they may be one or two as in *S. recurvans*. The habitat also is different, as *S. delicatulum* is a plant of higher elevations and more moist habitat, and is usually found growing with hepatics such as *Blepharostoma trichophyllum*, *Lepidozia reptans* and *Jungermannia exsecta*. These species were found growing with the type, collected by T. P. James, at Errol Dam, N. H.

Austin is quite right in saying that it is difficult to separate *H. cylindricarpum* from *S. delicatulum* when sterile, as the main difference is in the shape and position of the capsule, but there are leaf differences as well, which a practiced eye can detect.

Sullivant, in the Musci Allegheniensis, distributed two forms of *H. recurvans* from Grandfather Mountain, North Carolina; No. 17, which he considered typical, grew in thin, appressed mats, with *Archelejeunia clypeata*, was dark green in color, and had pedicels only one centimeter long; it is evidently referable to *S. delicatulum*. No. 18 was issued as *H. recurvans*, var. (*L. squarrosa* Michx.). It is a much coarser moss, with densely tomentose, matted stems, making taller tangled tufts with longer pinnate branches and pedicels 15-20 mm. long; the capsules are twice as large with the lid shorter in proportion; they are evidently what we have been considering typical *H. recurvans*. It appears as if Sullivant had critically studied Michaux's descriptions, and tried to refer the two forms which he recognized to them; but there is nothing to show that he had seen

the types, and as the descriptions are misleading, he evidently changed his opinion when he published the Icones. He referred to the specimens issued by Drummond as *H. amoenum* as a synonym. In Dr. Torrey's set, No. 196 appears to be a small form of *S. recurvans* mixed with *Hypnum pratense*. In the Musci Boreali-Americani, Sullivant and Lesquereux also issued two numbers in each set, one as *H. recurvans* and the other as an unnamed variety. In the first set I cannot see much difference between them, but in the second set, No. 447 *H. recurvans* var. is evidently *S. delicatulum*.

Austin has suggested a resemblance in the coarser forms of *S. recurvans* to *H. nemorosum*. I have only seen one specimen that at all approximated this species in size, and it suggested *S. Carolinianum*. They were collected by Dr. Small in the Canyon of Tallulah Falls, growing on quartzite rocks; they are bright glossy yellow or red-brown plants, with branches 7cm. long, and the pedicels 25mm. long; the leaves are strongly recurved. It occurs also in lax, loose mats in the same locality where the normal form was also collected. Austin also named some specimens in his herbarium *H. recurvans* var. *compactum;* they were collected at Otter Pond, near Closter, N. J., forming densely caespitose tufts, fully three centimeters high and matted together by brown tomentum. They evidently grew in rich moist soil, as I have noticed that this species when growing on the ground has a tendency to become pulvinate, while on roots of trees or on rocks it spreads out in thin mats. He also named some specimens in his herbarium *H. recurvans* var. *minus;* these are referable to *S. delicatulum*, but owing to the strongly recurved leaves, and the misleading characters of *H. laxepatulum* he did not recognize them for this species. In fact, Austin failed to discriminate between them. His idea about *H. recurvans* seems to have been that it was as variable a species as *H. cupressiforme*.

Kindberg has described *Raphidostegium Whitei* as having the leaves faintly or not recurved, the pedicel short and the tufts green. This agrees with the form we have been calling *H. laxepatulum*, but I have not seen the type.

In geographical distribution, *S. recurvans* has the greater range, having been collected in British America from New Foundland to Manitoba, along the Alleghanies from Maine to Georgia, northwestward to Michigan, Minnesota and Wisconsin. It appears to be unknown in the Rocky Mountains and the West Coast, where it is replaced by *S. Roellii*. In Part VII. of the Catalogue of Canadian Plants, *Raphidostegium Roellii* is credited to Cape Breton Id. N. S.; this determination needs investigation. In the immediate vicinity of New York City *S. recurvans* is not common, though it has been collected on the Palisades by Austin and Gilman; on Long Island by Dr. Grout, and in Westchester County, near Bedford, by me. It is common in the Catskills and the Mountains of Pennsylvania. *S. delicatulum* ranges from Hudson's Bay to Manitoba, along the Alleghanies from Vermont to North Carolina, is abundant in the Catskill and Adirondack Mountains as well as the mountains of southern Virginia. It is apparently more restricted in its range, occurring at higher elevations and in more moist shady localities.

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